No. 680,440. Patented Aug. 13, 1901.

B. E. F. RHODIN.

ELECTROLYTIC APPARATUS.

(Application filed July 19, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

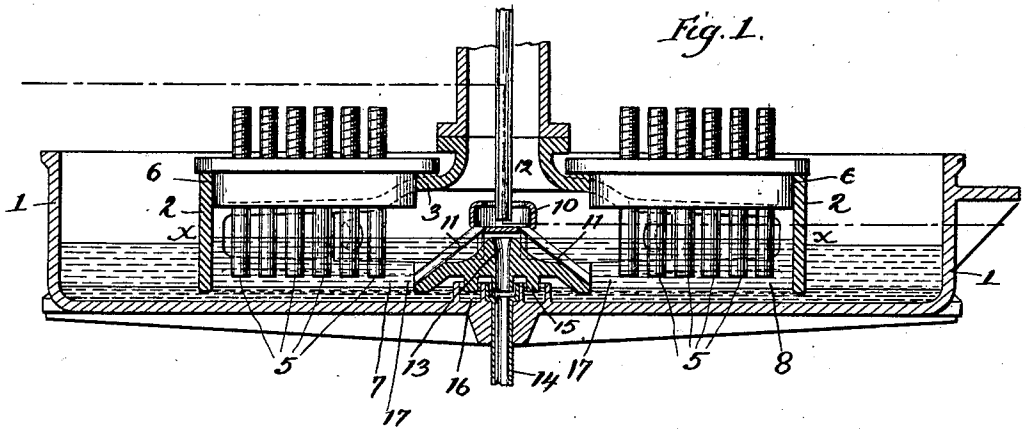
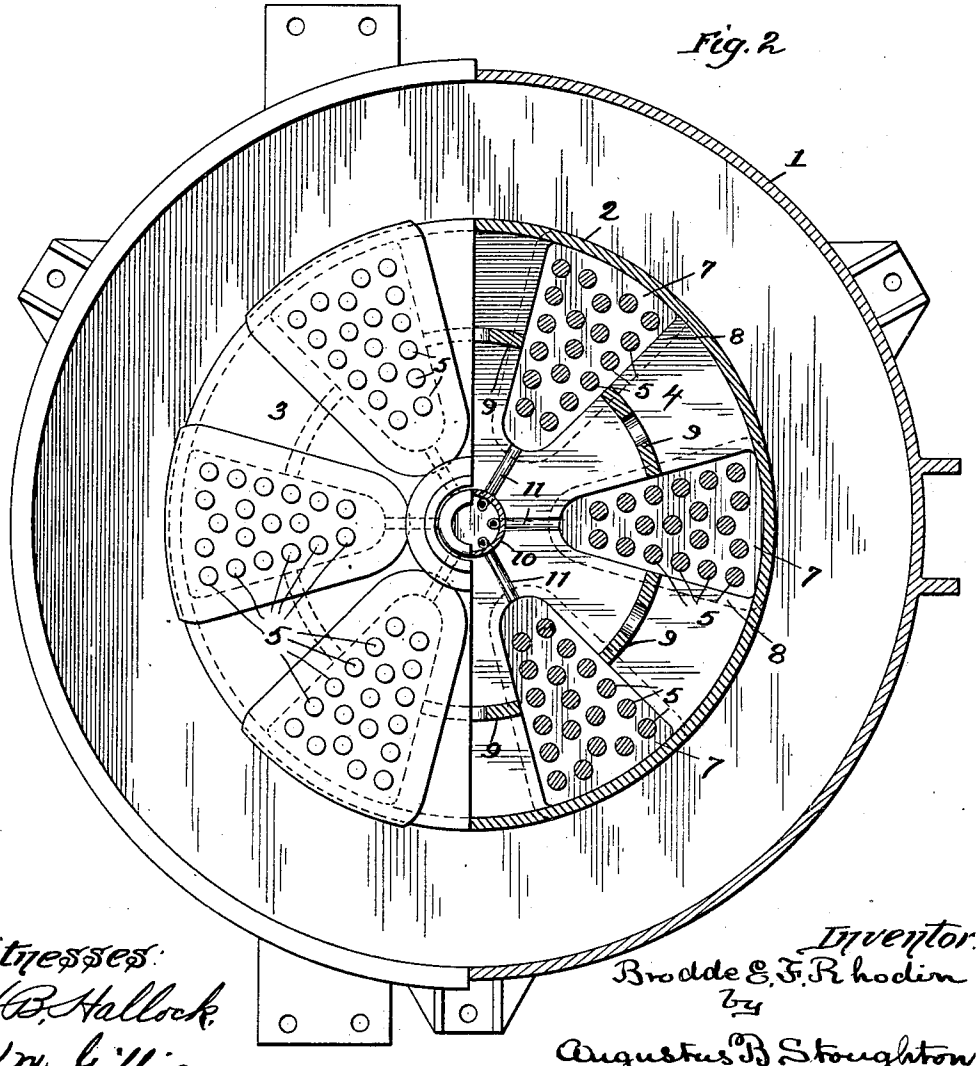


Fig. 2.



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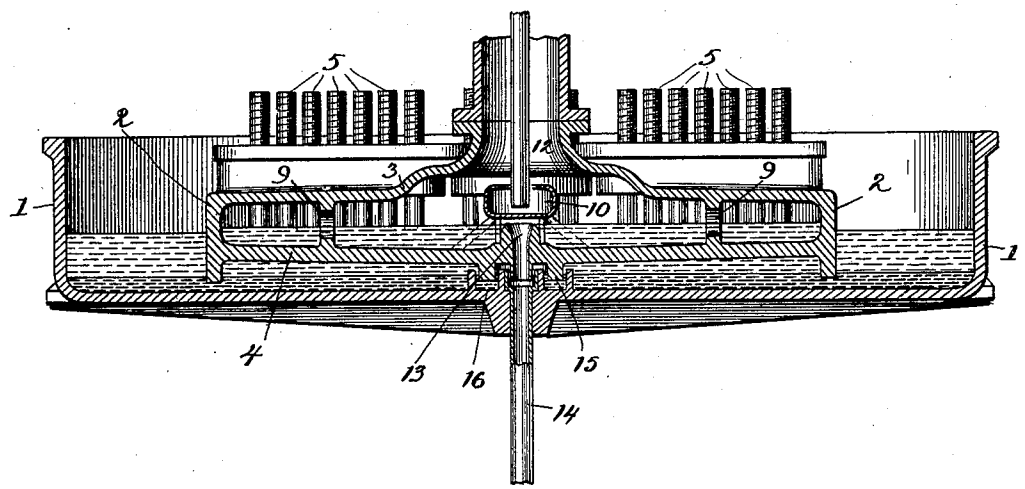
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(No Model.) 2 Sheets—Sheet 2.

Fig. 3.



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UNITED STATES PATENT OFFICE.

BRODDE E. F. RHODIN, OF SAULT STE. MARIE, CANADA, ASSIGNOR TO AMERICAN ALKALI COMPANY, OF CAMDEN, NEW JERSEY.

ELECTROLYTIC APPARATUS.

SPECIFICATION forming part of Letters Patent No. 680,440, dated August 13, 1901.

Application filed July 19, 1900. Serial No. 24,158. (No model.)

To all whom it may concern:

Be it known that I, BRODDE E. F. RHODIN, a subject of the King of Sweden and Norway, residing at Sault Ste. Marie, Province of Ontario, Canada, have invented certain new and useful Improvements in Electrolytic Apparatus, of which the following is a specification.

This invention relates to improvements which are applicable to the general type of electrolytic apparatus described, for example, in Letters Patent No. 608,300, of August 2, 1898, granted to J. G. A. Rhodin.

The principal object of the present invention is to insure the presence of a supply of comparatively-concentrated electrolyte—for example, of brine—in the field or fields or regions of maximum decomposition, and a description of what is believed to be the best means for the practice of the invention will now be given, in connection with the accompanying drawings, forming part hereof, and in which—

Figure 1 is a view, principally in central section, illustrating an electrolytic apparatus embodying features of the invention. Fig. 2 is a sectional view taken on the line 2 2 of Fig. 1, and Fig. 3 is a sectional elevation of the cell upon a line passing between the anode-compartments.

In the drawings, 1 is the outer vessel or combining-chamber, and 2 is the electrolytic cell. The latter is shown of generally cylindrical form, and it is mounted so as to be rotatable in respect to the vessel or combining-chamber 1. The bottom of this chamber 1 is covered with a layer of mercury, which acts as cathode and also as a seal between the interior of the electrolytic cell 2 and the bottom 1. The cell 2 is provided with a top 3 and a bottom 4. From the top 3 depend the positive electrodes 5, and, as shown, the top 3 is provided with openings 6, into which the carbon-carrying blocks are fitted. The carbons and their blocks constitute the electrodes and form the subject-matter of an application filed by me for Letters Patent of the United States and serially numbered 24,159. The bottom 4 is provided with openings 7, through which the lower ends of the carbon rods 5 depend, and each of these openings 7 is provided with a marginally-arranged depending flange 8, which dips into the mercury contained on the bottom of the vessel or chamber 1, and thus constitutes a seal.

9 represents reinforcements which may be interposed between the top and bottom of the cell 2 in cases where it is made of vitrified earthenware in order to sustain the weight of the top during firing in the kiln.

In the center of the cell 2 there is provided a cup or receptacle 10, which receives the incoming electrolyte, and from this cup the electrolyte is conveyed by way of radially-arranged conduits, ducts, passages, or pipes 11 to at or near the openings 7 in the bottom 4, which are in the fields or regions of maximum decomposition. The number of these ducts or passages 11 is immaterial and may be increased or diminished; but it should correspond with the number of flanged openings 7 in the bottom through which the anodes depend. The inlet of the cup 12 is located above the level $x\,x$ of the electrolyte in the cell for a purpose to be presently described.

13 is an outlet extending above the bottom of the cell 2 and substantially into line with the level indicated by the line $x\,x$. This outlet communicates with an off-take 14. Between the bottom of the cell and the bottom of the vessel 1 are arranged a circular flange 15 and a groove 16, which constitute a seal between the parts 1 and 2, and thus make the outlet 13 and the off-take 14, in effect, a continuous passage.

In use the electrolyte, which will be assumed to be brine, flows into the cup 12, and from thence by way of the pipes, ducts, passages, or conduits 11 to the field or fields 17 of maximum decomposition, which are the region or regions between the anodes and cathodes. In such regions the salt of the electrolyte is broken up into its elements, which in the present instance are chlorin and sodium. The electrolyte, after undergoing electrolysis in the field or fields of maximum decomposition, becomes weaker in respect to the salt which it holds in solution, and its specific gravity therefore falls, so that the electrolyte rises to the brine-level $x\,x$ and reaches the outlet 13 and flows from the cell.

From the foregoing description it is apparent that the electrolyte passes continuously

through the cell and that the strong electrolyte is delivered between the poles, which is obviously advantageous, as it is at such locations that the maximum decomposition occurs. Moreover, the presence of a supply of concentrated brine at the regions of maximum decomposition permits of the use of a maximum current density at a minimum of potential difference, so that a comparatively small cell may be employed and made to produce a comparatively large output.

It will be obvious to those skilled in the art to which my invention appertains that modifications may be made in detail without departing from the spirit thereof. Hence I do not limit myself to the precise construction and arrangement of parts hereinabove set forth, and illustrated in the accompanying drawings; but,

Having thus described the nature and objects of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. An electrolytic cell provided with a plurality of anode-compartments arranged in a ring and with a centrally-placed cup and with ducts, passages or conduits leading from the cup to the compartments, substantially as described.

2. An electrolytic cell provided with a plurality of anode-compartments arranged in a ring and with ducts, passages or conduits radiating from the center of the ring and leading to these compartments, substantially as described.

3. An electrolytic cell provided with depending anodes and flanges each surrounding an anode and constituting an anode-compartment and having a cup located above the flanges and also having ducts, passages or conduits radiating from the cups and leading to the anode-compartments, an exterior vessel, and cathode connections, substantially as described.

4. An electrolytic cell provided with a plurality of anode-compartments concentrically arranged and with an outlet and a cup disposed centrally of the compartments and with ducts or passages leading from the cup to the compartments, substantially as described.

5. An electrolytic cell provided at its bottom with depending flanges forming the walls of anode-compartments and with a cup located above and centrally of the anode-compartments and with ducts leading from the cup to the anode-compartments, substantially as described.

6. In combination an external vessel or chamber provided with an offtake and adapted to contain mercury, cathode connections, an electrolytic cell revolubly mounted in said vessel or chamber and provided with a plurality of downwardly-extending flanges forming the walls of anode-compartments and with ducts radiating from the center of the cell and leading to the anode-compartments and with an outlet, anodes arranged in the anode-compartments, means at the center of the cell for supplying the electrolyte to said ducts, and a flange and groove interposed between the cell and vessel and adapted to constitute a seal, substantially as described.

In testimony whereof I have hereunto signed my name.

BRODDE E. F. RHODIN.

In presence of—
GRACE B. HURLBUT,
K. M. GILLIGAN.